

Reply

A Suitable Model for Wound Healing: How Many Times Are We to Stumble Over the Same Block?

Professor Karu's letter [1] raises an interesting issue, which is the subject of ongoing debate within the laser therapy community (researchers and clinical users) i.e., is laser photobiostimulation (the use of low-intensity laser irradiation to stimulate biological and in particular wound healing processes) observable only when "normal" healing is compromised or delayed? Certainly, in our clinical experience with laser therapy, this would indeed seem to be the case: whereas chronic ulceration may (subject to the application of appropriate dosages) respond well to laser treatment, this would appear not to be the case for uncomplicated "acute," postoperative wounds. This notwithstanding, we suggest that the situation is not as clear-cut as Professor Karu might suggest (e.g., a previous survey of users by this center [2] indicated routine clinical application in acute wounds). In the particular case of murine wound healing (one of most popular laboratory models of wound healing), it should be stressed that biostimulatory effects have been reported in both uncomplicated [3] and delayed [4] healing models. Thus, it would appear that further detailed studies are required before more definitive pronouncements are possible.

Another issue worthy of consideration is Professor Karu's criticism of the radiation impaired healing model that we used in our original paper [5]. This can be challenged at two levels: in the first instance, the inhibitory effects of X-ray radiation on wound healing is already well recognized [6,7], and we presented direct evidence of such effects in our article (see Figs. 1, 5). Furthermore, although our model may arguably be less directly relevant to some types of clinical wounds than other models of delayed healing (e.g., genetically diabetic mice [4]), radiation-impaired healing is a significant problem in patients undergoing radiotherapy [8] and, therefore, an important area for investigation. Beyond this, we point out that a previous study by Professor Karu on the

reparative processes of HeLa cells [9] similarly used ionizing radiation to induce cellular damage to better investigate the biostimulative effects of He-Ne (632.8 nm) laser. Given this, perhaps the problem we should be considering is not the adequacy of the model but rather the appropriateness of the wavelength we employed (i.e., 890 nm; infrared rather than visible red). To this end, we are currently assessing the efficacy of 660-nm radiation.

A. Lowe, DPhil
D.G. Baxter, DPhil
Rehabilitation Sciences Research Group
University of Ulster
Jordanstown BT370QB, Northern Ireland

REFERENCES

1. Karu T. A suitable model for wound healing: how many times are we to stumble over the same block? *Lasers Surg Med* 1999;25:283.
2. Baxter GD, Baxter GD, Bell AJ, Allen JM, Ravey J. Low level laser therapy: current clinical practice in Northern Ireland. *Physiotherapy* 1991;77:171-178.
3. Lyons RF, Abergel RP, White RA, Dwyer RM, Castel JC, Uitto J. Biostimulation of wound healing in vivo by a helium neon laser. *Ann Plast Surg* 1987;18:47-50.
4. Yu W, Naim JO, Lanzafame RJ. Effects of photostimulation on wound healing in diabetic mice. *Lasers Surg Med* 1997;20:56-63.
5. Lowe AS, Walker MD, O'Byrne M, Baxter GD, Hirst DG. Effect of low intensity monochromatic light therapy (890 nm) on a radiation-impaired, wound healing model in murine skin. *Lasers Surg Med* 1998;23:291-298.
6. Gorodetsky R, McBride WH, Withers HR. Assay of radiation effects in mouse skin as expressed in wound healing. *Radiat Res* 1988;116:135-144.
7. Bernstein EF, Harisiadis L, Salomon GD, Harrington F, Mitchell JB, Uitto J, Glatstein E, Russo A. Healing impairment of open wounds by skin irradiation. *J Dermatol Surg Oncol* 1994;20:757-760.
8. Bujko K, Suit HD, Springfield DS, Convery K. Wound healing after preoperative radiation for sarcoma of soft tissues. *Surg Gynecol Obstet* 1993;176:124-134.
9. Karu T, Pyatibrat L, Kalendo G. Irradiation with He-Ne laser can influence the cytotoxic response of HeLa cells to ionizing radiation. *Int J Radiat Biol* 1994;65:691-697.